Inventor. Lawrence J. Seigel

Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"

Serial No.: Unassigned
Docket No.: 03237.0001U2

Filing Date: December 27, 2001
Contact: Lawrence D. Maxwell, Esq. (404) 688-0770

EXPRESS MAIL LABEL NO.: EL491884035US Sheet 1 of 22

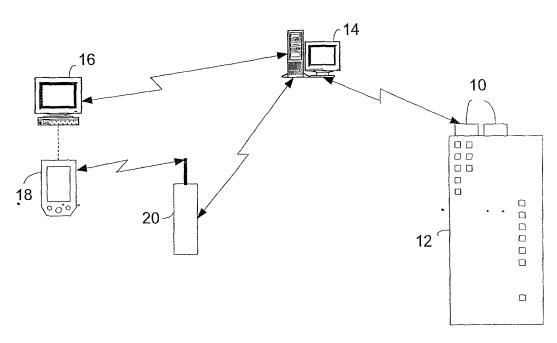


FIG. 1

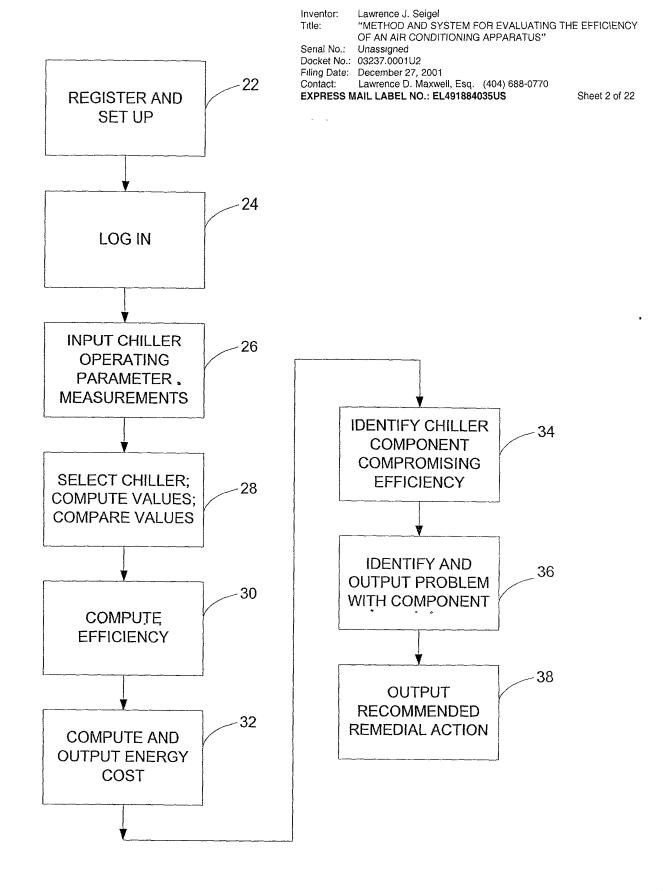
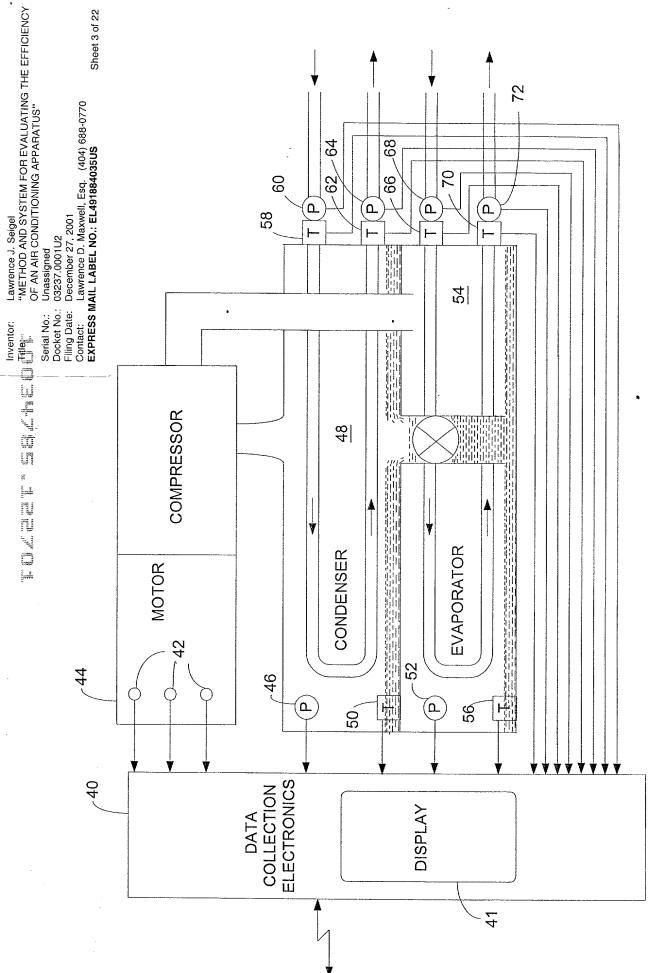


FIG. 2



The state of the s

FIG. 3

Man //challencheck.com/	tomize Lini
CHILLERCHECK.COM	
Welcome to ChillerCheck com	
If you are a current user, please log in using the form below	
If you do not currently have a username and password, or if you have forgotten one or both of them, please send an e-mail to help@chillercheck.com	A
If you'd like to learn more about the ChillerCheck service and how to subscribe, <u>click here</u>	Lick
Username: northside	
Password: 74	
etace, m	
10	
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FIG. 4

Title:

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Activity 🕳 Communi	nttp://chillercheck.com/ y & Eustomize Links	- 3 7 Entertainment	② Free Hotmail		COLUMN TO THE STATE OF THE STAT			4 miles a. 4.4. " - 14.4.4."
						Tale		
hillerCheck <u>Main</u>	Daily Report	Most Recent F	Readings	Add Location	Add User	Edit Users	<u>Download P</u>	ılm Application
	82	01	ChillerChe	ck Main P	age 📏	,	,	
		07		1	80 8	6 38	?)	
Welcome to Chille	erCheck, Demo Us	er.			00 -			
This site is designe	d to enable centrifu	gal chiller owners a	and operators to q	uickly and easi	iy evaluate the	operating effici	ency of their centri	ugal water
chillers.								
P								
				D	C	ah waw ara aut	horzad to work wit	h
Below is a list of the	e Locations and Ch	llers currently regi	stered for your co	mpan y, Demo	Company, whi	ich you are aut	horized to work wit	h
							horized to work wit	h
New feature: You	can now keep co	mplete Maintena	nce Records for	your Chiller o	n the ChillerC	theck site.		h
New feature: You		mplete Maintena	nce Records for	your Chiller o	n the ChillerC	theck site.		h
New feature: You	can now keep contenance Records	mplete Maintena	nce Records for r in the list belo	your Chiller o	n the ChillerC	Check site.		h
New feature: You	can now keep co	mplete Maintena	nce Records for	your Chiller o	n the ChillerC	Check site.		h
New feature: You	can now keep contenance Records	mplete Maintena	nce Records for r in the list belo	your Chiller o	n the ChillerC	Check site.	ords. 92	h
New feature: You	can now keep contenance Records	mplete Maintena: " link for a Chille VISW DATE to work with the I	nce Records for r in the list below Y REPORT	your Chiller o w to enter, vie	n the ChillerC rw or edit Mai	check site.	92 // ¹⁵⁶	158 ر
New feature: You	can now keep contenance Records	mplete Maintena: " link for a Chille VISW DATE to work with the I	nce Records for r in the list below Y REPORT	your Chiller o w to enter, vie	n the ChillerC rw or edit Mai	check site.	ords. 92	158 ر
New feature: You	can now keep contenance Records	Tink for a Chille VISW DAN to work with the some necessary in	nce Records for r in the list below Y REPORT Information below Information has no	your Chiller o w to enter, vie	n the ChillerC	check site.	ords. 92 156 "afen" ink to see	15 8
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New feature: You Click on the "Main Please click on the If a red * appears n	can now keep contenance Records	Tink for a Chille VISW DAN to work with the some necessary in	nce Records for r in the list below Y REPORT Information below Information has no	your Chiller o w to enter, vie MOST F	n the ChillerConwor edit Mai LECENT REA up for the chille Edit Chiller In	check site. intenance Rec	i 56 Aden" ink to see Delete this Co	deta's 15 8
New feature: You Click on the "Main Please click on the If a red * appears n Admin Bldg	can now keep contenance Records 3 3 the appropriate linkext to the Chiller #,	" link for a Chille VUSV-PAU to work with the isome necessary in Add-Chiller to Log Records	r in the list below REPORT Information below Information has no	your Chiller o w to enter, vie MOST F	n the ChillerConv or edit Mai LECENT REA up for the chille Edit Chiller In Edit Location	check site. intenance Rec in Click on the Cliformation Information	ords. 92 156 "Alen" ink to see	deta's 15 8
New feature: You Click on the "Main Please click on the If a red * appears n Admin Bldg Chiller #: 2	can now keep contenance Records 3 3 the appropriate linkext to the Chiller #,	" link for a Chille VUSV-PAU to work with the isome necessary in Add-Chiller to Log Records	nce Records for r in the list below Y REPORT Information below Information has no Maintenance this Location	your Chiller o w to enter, vie MOST, F Type been set o	n the ChillerConwor edit Mai LECENT REA up for the chille Edit Chiller In	check site. intenance Rec in Click on the Cliformation Information	i 56 Aden" ink to see Delete this Co	leta's 15 8
New feature: You Click on the "Main Please click on the if a red * appears n Admin Bldg. Chiller #: 2 Central Plan	e the appropriate lintext to the Chiller #,	" link for a Chille VISW DAL to work with the isome necessary in Add Chiller to Add Chiller to	r in the list below REPORT Information below Information has no Maintenance Ithis Location	your Chiller o w to enter, vie Mosset Records	n the ChillerConv or edit Mai LECENT REA up for the chille Edit Chiller In Edit Location	check site. Internance Recommendation Cinformation Cinformation Cinformation	ords. 9 2 2 So 2 Jen" ink to see Delete this Co Delete this Co	leta's 15 8 cation willer cation

FIG. 5

Inventor:
Title "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY OF AN AIR CONDITIONING APPARATUS"

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Title:

Lawrence J. Seigel

"METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY

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ChillerCheck	Daily	Most Recent	Add	Add	Edit	Download Palm
Main	Report	Readings	Location	User	Users	Application
82	84 Ac	ld a Chiller at	Atlanta (Office	Bldg.	88 90

Please fill in all information in the form below, then click the "Add Chiller" button.

You will then be taken back to the ChillerCheck Main page, where you can work with any of your Location, Chiller or Chiller Log records.

Note: If you do not have all the information below available at this time, you can still add the Chiller by filling out only the required information (marked with a * below) now. You can come back later and add the rest of the information. However, you will not be able to make efficiency calculations or graph trends until all Chiller information has been recorded.

Chiller Information

Help * Chiller #:	1 - 96
* Make:	Choose a Make 98
Hope * Model:	-100
Help! Serial #:	-102
* Refrigerant Type:	Choose a refrigerant 10 4
Year Chiller Was Manufactured:	Choose a year of manufacture 06
Efficiency Rating (kw/ton):	
* Energy Cost (\$/kw hour):	

F16.6A

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Haipi * Weekly	-112									
778,000	The common series to the contract of the contr									
Hrs. of Operation:										
<i>(intal</i> * Weeks	-114									
Per Year of Operation:										
* Average Load Profile:	1 %116									
Help! * Tons:	118									
* Design	120									
Voltage:	American and a configuration and a configurati									
দিক্তী * Full-Load	-122									
Amperage:										
Now we need some information about the Condenser.										
	Choose a pressure unit									
(Help) Design	1									
Condenser Water Pressure Drop:	126									
(This value may be omitted	121									
if necessary, but your calculations will										
be more accurate if you have it.										
If you enter a value, you must choose a unit of										
measure.)										
Help! Please	Choose a pressure unit									
choose a unit of	Description to international register and another section and the section of the									
measurement for	128									
the Actual										
Condenser Water Pressure Drop:										
Halpi Please										
I ICASC	Choose a pressure unit									
	Choose a pressure unit									
choose a unit of	Choose a pressure unit									
choose a unit of measurement for Condenser	A service of a Common Service of a service o									
choose a unit of measurement for	A service of a Common Service of a service o									
choose a unit of measurement for Condenser Pressure: Design Condenser	130									
choose a unit of measurement for Condenser Pressure:	A service of a Common Service of a service o									

FI6.6B

Now we need some information about the Evaporator.										
Chill Water Pressure Drop: (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)	Choose a pressure unit									
choose a unit of measurement for the Actual Chill Water Pressure Drop:	Choose a pressure unit									
choose a unit of measurement for Evaporator Pressure:	Choose a pressure unit									
Design Evaporator Approach Temp: (This value may be omitted if you do not have it.)	142									
Evaporator Design Outlet Water Temp:	144									
Please choose a m	ethod of calculating Oil Pressure Differential for the Compressor.									
Calculate Differential by:										

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FIG. 6C

There are just	a few more things we need to know about this chiller.							
Does the chiller have a readout for Purge Run Time?	C Yes & No 143							
If so, is the Purge Run Time measured only in minutes, or in both hours and minutes?	Minutes Only F Hours and Minutes							
Please set a maximum amount of Purge Run Time per day you wish to allow before you are sent an alert.	Minutes 147							
Does this chiller have a readout for Bearing Temperature?	C Yes C No							
Operator Notes: (Enter any notes you might want to record about this chiller.)	<u>150</u>							
	Add Chiller Info							
149								

FIG. 6D

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A	8 1.0	62 O	9.0	40	1.0	10.0	49.1	39,8	39.0	0.0	-16.0	10.0	25.8	140	50	123	123	123	620	620	820	480	483	480
9:08:AM Eff. Loss: 10.8%						2				16														
% Load: 57.9%			(COM)		(5.9%)			S	-680		19048		20		225			533	XX 5	Ref	1909-		ere i	200
ocation: Main Chiller F	2.000	Chill	\$23 cm	2 8.49	F-QPQX	S. 825	-	Avra	Time.	don es	et en e	1200	199	Lien	-in	นาว	12345	102	zen	leno	išno	1200	480	280 B
8/21/01 TP 78.0 810 AM	820	84.0	0.3	TULU			50.1	144.0	42.0	00							1233	3.0		300		L.		
Eff. Loss: 35.6%																						1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
% Load: 87.0%	lant	Chill	la i	3A	-	dia:	11	1000	E 121			Mrv.		Trong		L-S-X	(Minc.	2008	\s.	19 ***	<u> </u>	17.7	1 /1/00/20	ex and
ocation; main Chiner i	18111		*************************	A	U.2	186		Mr. 180	36.0	0.5		A18807"	100	139	50	942	12345	442		Tied	Lice	Jon	l son	1000

FIG. 7

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ChillerCheck Main		<u>Chil</u>	ller #2	Main	Page		Maint.	Record	l <u>s</u>	<u>A(</u>	d Ma	int. Rec	<u>ord</u>	Ad	d Log	Reco	Patentiës r <mark>d Vi</mark>	ew Log	sheet		Chart	Trend	<u>ils</u>
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To view an efficiency ensiysis, click on the Reading Dale.	t T m p	t T e m p	g T e m p	p p r o z c n q	* * * * * * * * * * * * * * * * * * * *	gr 200	0100	t T S M P	t T a m p	T e m p	70.0407	8 8 11 1	* Drop	, D	P T S M P	L + + +	H o a r s	h * *	1 3 4 2 2	8 2 8 8	h 8 8	n 4 8	n 3 6
7/3/01 DU 2-42 PM Eff, Loss: 13.3% % Load: 77.9%	78.7	85.8	90.2	4.6	168.0	-09	10.0	619	417	38.0		85.5	14.0	20.0	138	6	30290.0	850	888	866			480
7/2/01 DU 1.42.PM Eff. Loss: 14.3% % Load: 83.3%	77.0	83	88.4	51	163 0	-13	10.0	51.7	42.0	38.0	2.0	65.5	20.0	20.0	135	50	30240.0	925	950	950			
6/27/01 DU 2:58 PM Eff, Loss: 16.5% % Load: 79.0%	77.7	83.3	86.4	5.5	163.0	-13	10.0	£1,4	42.4	38.0	2.8	65.6	190	20.0	135	50	30170.0	898	900	901	460	480	480
6/26/01 DU	78.5	84.5	87.9	15	163.0	0.0	10.0	49.8	42.3	38.5	4.3	65.5	140		136	60	30150.0	700	700	700	480	480	480

FIG. 8

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ork with Log Records - Microsoft Edic Yew Payories Look	Help			
Back ess 2 http://chillercheck.com/applic	earch Favorite Histor 1 abon/chillermain clm?ChilleriD=467	<u> </u>	Ge Links (F Activity 🎉	ommunity @]Customen Links
	CHILLER	CHECK.C	МО	
ChillerCheck Main	Main Page for this Chiller	Add New Log Record	<u>View Logsheet</u>	Chart Trends
	Work with Log Records fo	r Chiller #: 1 at Main Ch	niller Plant.	
Below is a list of Log Recor	ds for your Chiller #1		78 170	, 172
	v to work with the records, which are identif		out Delete this Loo-R	School Co.
Eliteratura (12 mars 1	And the second s	e Efficiencies Edit this Log Reco		
Commence of the Association and the Commence of the Commence o	3	e Efficiencies Edit this Log Rec		ecord 📐
\$300 ~ COLORUS TO 1/4 + 4 1/8 1999		te Efficiencies Edit this Log Rec		ecord \
		te Efficiencies Edit this Log Ret	ord. Delete this Loo B	, 1, 10, 10, 10, 10, 10, 10, 10, 10, 10,
	•	1	166	168
		164	160	190

FIG. 9

Lawrence J. Seigel

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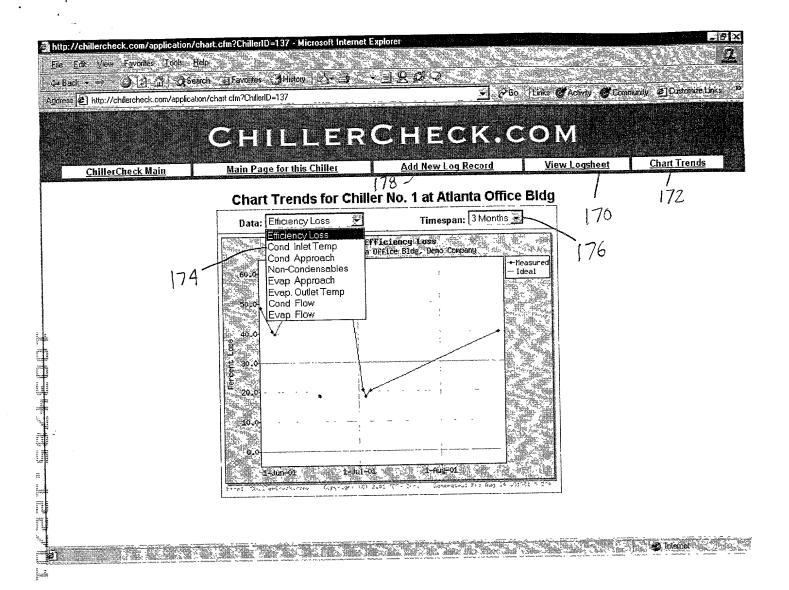


FIG. 10

Lawrence J. Seigel Inventor:

"METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY Title:

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CHILLERCHECK.COM

ChillerCheck Main | Main Page for this Chiller | Add New Log Record | View Logsheet | Chart Trends

Add a Log Record for Chiller #: 1 at Main Chiller Rlant.

172

Please enter your readings into the form below, then click the "Add Record" button:

Log Record

Operator:	Tim	180
Reading Date:	August 24, 2001	'
Reading Time:	9:32 AM	182
Condenser Re		
Inlet Water Temp:	1°F 184	
Outlet Water Temp:	oF~186	
Refrigerant Temp:	○F 188	
Condenser Pressure:	PSIG 190	
Actual Condenser Water Pressure Drop:	PSIG 192	
Evaporator Rea	adings	
Inlet Water Temp:	0F 194	
Outlet Water Temp:	0F 196	
Refrigerant Temp:	°F)98	
Evaporator Pressure:	In. Hg. 200	
Actual Chill Water Pressure Drop:	PSIG 202	

FIG. 11A

Inventor:

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Compressor Re	adings									
Oil Pressure (High):	1b. 204									
Oil Sump Temp:	○F 206									
Oil Level:	% 200									
Bearing Temp:	○F 2:0									
Run Hours:	- Z12									
Purge Pumpout Time:	<u>-214</u>									
Electrical Readings										
Amps Phase 1:	-216									
Amps Phase 2:	- 218									
Amps Phase 3:	- 220									
Volts Phase 1:	- 222									
Volts Phase 2:	- 22 4									
Volts Phase 3:	226									
Operator No	otes									
	228									
Add Log Rec	ord									

FIG. 118

Inventor:

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OHILLERGHECK.COM

Efficiency/Calculation for Chiller #1 at Admin Bldg Readigg taken on October 10, 2001 at 1:50 PM Add Log Record Add Maint. Record Majnt, Records Chiller #1 Main Page

Chart Trends

Results

 20.9%	Efficiency Loss
 \$ 11,410	Cost of Efficiency Loss
 \$ 65,993	Actual Cost to Run for Year
\$ 54,583	Target Cost to Run for Year

Detailed Cost of Efficiency Loss

		-
Solution	Flx it.	Fix it.
\$ Cost	\$ 5,187	\$ 6,222
Efficiency Loss	9 5%	11.4%
Problem	Fouled Tubes - Condenser	Non-condensables - Condenser

Your Condenser Water Flow is 3.6% below design.

Your Evaporator Water Flow is 21.9% below design.

There is an electrical imbalance that may be decreasing the performance of your Chiller. The voltage imbalance is 3.62%.

The % load at this reading time was 88.9%.

Back to the main page for this Chiller.

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Unassigned
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December 27, 2001

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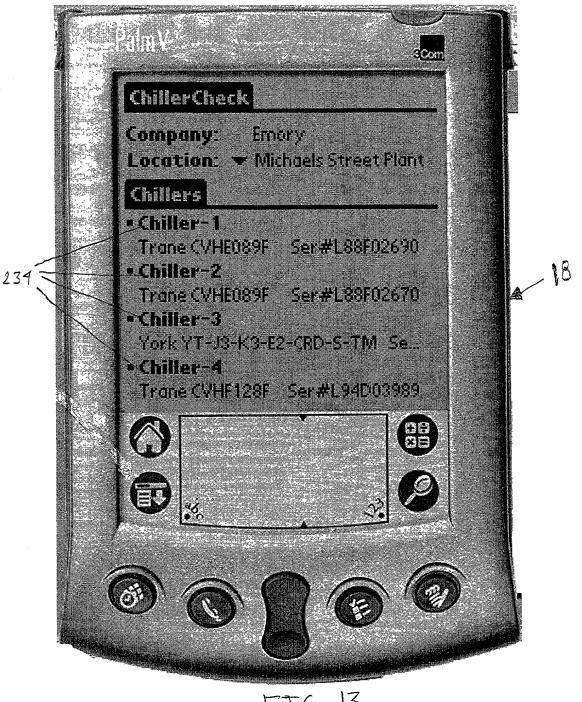


FIG. 13

Inventor: Lawrence J. Seigel

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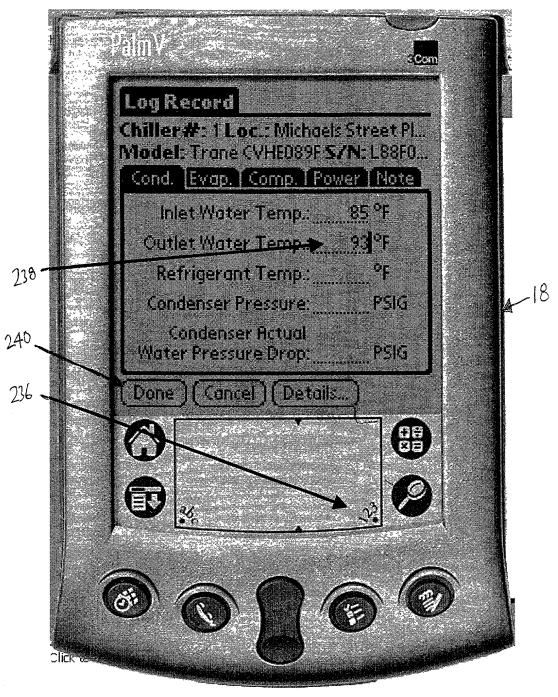


FIG. 14

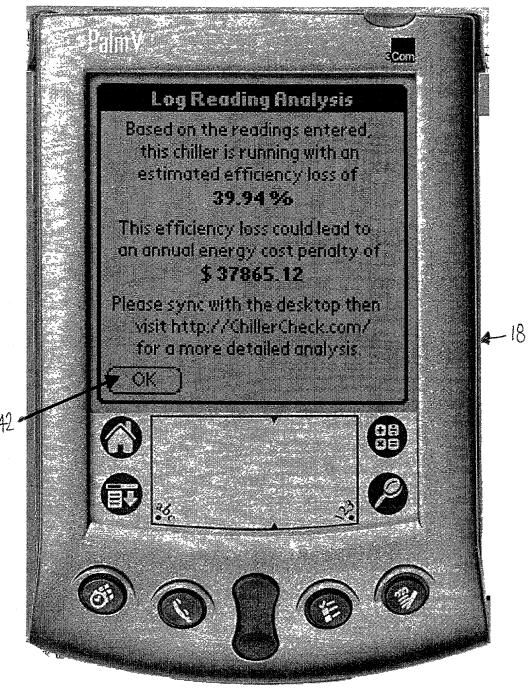
Lawrence J. Seigel "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY Title:

OF AN AIR CONDITIONING APPARATUS"

Serial No.: Unassigned Docket No.: 03237.0001U2 Filing Date: December 27, 2001

Contact: Lawrence D. Maxwell, Esq. (404) 688-0770 EXPRESS MAIL LABEL NO.: EL491884035US

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FI6.15

inventor:

Lawrence J. Seigel

Title:

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Lawrence J. Seigel

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CHILLERCHECK.COM

172

ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet | Chart Trends

Add Maintenance Record for Chiller #1 at Admin Bldg. 165

Please fill in all information in the form below, then click the "Add Maintenance Record" button.

You will then be taken back to the Maintenance page for this chiller.

Maintenance Information

Annual Maintenance Date:	Select a Month Day Year Year		
Oil Maintenance			
Oil Change Date:	Select a Month Day Year Year		
Date Oil Added:	Select a Month Day Year Year		
Quantity of Oil Added (Gallons):			
Oil Analysis Date:	Select a Month Day Year Y		
Eddy Current Tests			
Eddy Current Test Date (Condenser):	Select a Month Day Year Y		
Eddy Current Test Date (Evaporator):	Select a Month Day Year Y		
Major Stop Inspection (compressor teardown)			
Major Stop Inspection:	Select a Month Day Year Year		
Refrigerant Maintenance			
Refrigerant Analysis Date:	Select a Month Day Year Y		
Date Refrigerant Added:	Select a Month Day Year Year		
Quantity of Refrigerant Added (Pounds):			
Tube Cleaning			
Condenser Tube Cleaning Date:	Select a Month Day Year Y		
Evaporator Tube Cleaning Date:	Select a Month Day Year Y		
Purge Maintenance			
Purge Tank Reclaim Date:	Select a Month Y Day Year Y		
Purge Run Time Reading When Tank Reclaimed:			

FIG, 16A

Purge Filter Dryer Change Date:	Select a Month Day ▼ Year ▼	
Major Repairs		
Major Repair Date:	Select a Month Day Year Y	
Major Repair Description:	• • • • • • • • • • • • • • • • • • •	
Notes		
Maintenance Notes: (You may enter a note about any type of maintenance.)		
Add Maintenance Record		

FIG. 16B

Inventor: Lawrence J. Seigel
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CHILLERCHECK.COM

ChillerCheck Main | Chiller #1 Main Page | Maint. Records | Add Maint. Record | Add Log Record | View Logsheet | Chart Trends

Maintenance Records for Chiller #: 1 at Admin Bldg.

165 Below is a list of the most recent Maintenance Operations for your Chiller # 1. You may click on the name of a Maintenance Type to view all records of that type.

Maintenance Type	Most Recent Maintenance		
Annual Maintenance:	October 18, 2001		
Oil Maintenance			
<u>Oil Change:</u>	October 18, 2001		
<u>Oil Analysis:</u>	October 1, 2001		
Eddy Current Tests			
Condenser Eddy Current:	September 9, 2001		
Evaporator Eddy Current:	September 10, 2001		
Major Stop Inspection (compressor teardown)			
Major Stop:	January 3, 2000		
Refrigerant Maintenance			
<u>Refrigerant Analysis:</u>	January 3, 2000		
Refrigerant Added:	August 23, 2001 – Quantity: 100 Pounds		
Tube Cleaning			
Condenser Tube Cleaning:	October 19, 2001		
Evaporator Tube Cleaning:	February 5, 2000		
Purge Maintenance			
Purge Tank Reclaim:	February 7, 2001 – Purge Run Time at Change: 1212123		
Major Repairs			
<u>Major Repair</u> :	April 4, 2000 Repair Description: motor burnout		
Maintenance Notes			
<u>Notes</u> :	November 5, 2001 Note: starter problems resulted in burnout		

FIG. 17

Inventor:

Lawrence J. Seigel

Title:

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